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VIEWS, NEWS AND INTERVIEWS.

"One of the most difficult matters in connection with electrical manufacturing is to know just how many of a certain article to manufacture for stock," remarked a man who is good at this sort of thing. "You cannot really know this, but you must use your judgment. The best that you can expect from a man placed in this position is that he must be a good guesser. That's about what it amounts to—just guessing. As an example of this, I am reminded that in 1892 a large electric manufacturing company, with which I was then connected, was puzzled as to how to regulate its stock of overhead railway material. Several of us conferred together and finally decided unanimously that it wouldn't be safe to make up a very large stock as the chances were that something better than the overhead trolley system would soon be developed. We all thought the day of underground conduit roads had arrived. Now see how far wrong we were. Our business in overhead materials in 1893 was larger than ever before and we were soon behind in our orders. The business for 1894 in this department is already double that of 1893 and it looks as if it would double again in 1895. So you see that in this instance we were all poor guessers. And, by the way, let me tell you that this electric railway business is comparatively a new field. It's the biggest thing in the electrical industry and the development is going to be truly phenomenal."

The shortest electric road in the country is said to be the St. Louis and East St. Louis Electric Railway, which runs its cars over the Eads bridge across the Mississippi River at St. Louis.

Mr. Burt R. Braddock recently wrote for *Golden Hours* an account of his experiences with several "electricians" whom he employed to repair his electric bells, burglar alarms, etc. Mr. Braddock gives the following as a verbatim copy of a bill he received:

Mr. Burt R. Braddock,

DR. TO G. B. PHOOL & COMPANY,

PRACTICAL ELECTRICIANS.

June 6.	To taking away cut-off and spoiling it	$1.15
" 7.	To repairing damage done to cut-off.	2.60
" 8.	To calling at house to assure myself things did not work—one hour	.50
" 9.	To making gas lighting troubles—three and one-half hours	1.75
" 10.	To passing the house on foot	.25
" 11.	To breaking 10 cent push-button and repairing same	.60
" 11.	To patting the dog	1.25
" 12.	To passing the house in wagon	.50
" 15.	To time at house trying to cause more trouble—one and one-half hours	.75
" 15.	To breaking and repairing 50 cent burner	.75
" 17.	To one new basement bell	1.25
" 17.	(No charge for misplacing $1.50 buzzer).	
" 17.	To leaving the house where I found it	2.25
" 18.	To three new batteries	4.25
" 18.	To refraining from disturbing anything else	1.00
	Total	$26.40

Pennsylvania has 99 street railway companies. The highest rate of dividend paid by any of these companies during the year about closing was 20 per cent.

Has $100,000 In Cash On Deposit.

TO THE EDITOR OF ELECTRICAL REVIEW:

I notice in your journal of this date a statement to the effect that this company is indebted to the Atlantic Trust Company in the sum of $200,000. Permit me to say that this company does not now, owe, and never has owed, the Atlantic Trust Company a dollar. On the contrary, the company has nearly $100,000 cash deposited with the Atlantic Trust Company. Yours truly,

WM. BRACKEN,
President The Consolidated Electric Storage Company.
New York, December 12, 1894.

Who Makes Wood Cases For Electric Bells?

TO THE EDITOR OF ELECTRICAL REVIEW:

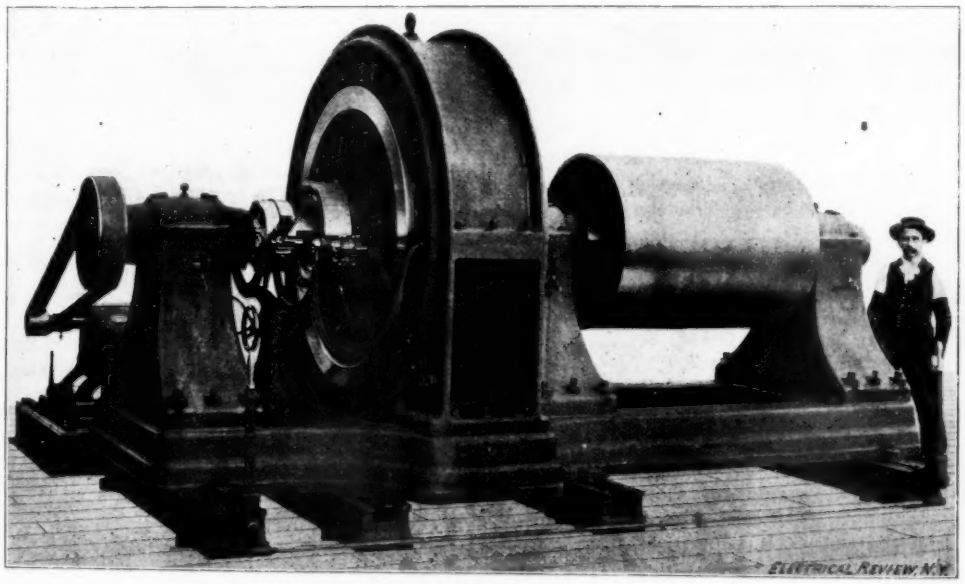
We would like to have the address of two or three manufacturers of wood cases for electrical bells and such apparatus. We have never seen the advertisement of any such concern in the electrical papers and I thought that you might possibly know something of them or could learn for me, for which I will be very greatly obliged. Very truly yours,

HY. S. THORNBERRY,
Toronto Electrical Works.
Toronto, Ont., December 10.

The "Wood" Iron-Clad Compound Alternator.

The Fort Wayne Electric Corporation, of Fort Wayne, Ind., are the manufacturers of the "Wood" iron-clad compound alternator shown in the illustration on this page. This machine is in no sense an experiment as several of them have been in satisfactory service for nearly two years. The makers claim the following features of merit to recommend the "Wood" alternator: Highest electrical efficiency, solidity and best possible mechanical construction, symmetrical design, and the most thoroughly ventilated armature ever constructed.

The four smaller sizes of these alternators are supported on a metal sub-base of improved construction, while the two larger sizes are fitted with out-board bearings and supported on specially constructed rails. All the machines are fitted with a patent belt tightener, enabling the main or exciter belt to be tightened independently and without interfering with each other.



THE "WOOD" IRON-CLAD COMPOUND ALTERNATOR.

The direct current exciter which accompanies the "Wood" alternator is of the toothed armature type and has an output of double the capacity required. It also possesses nearly all the advantages claimed for the alternator. These machines are wound for 1,000 or 2,000 volts, as required, and are over-compounded for from five to ten per cent drop. They are made in the following sizes:

Kilowatts.	Lights.	Total Weight.	Speed.
37.5	750	3,695	1,400
50	1,000	3,745	1,400
75	1,500	7,620	1,050
90	1,800	7,740	1,050
150	3,000	18,835	700
300	6,000	37,240	467

The exciters are made in four sizes, 1, 2, 4 and 8 kilowatts, all generating 110 volts.

Origin of Telegraphing Through Water Without Wires.

To the Editor of Electrical Review:

The sending of electrical signals through water, as the medium of conductance, having lately occupied the attention of many European and American electricians, some historical data concerning this branch of electrical science may be of interest to the readers of your valued journal.

So far as I am aware no succinct historical sketch of the development of that art has been published, and comparatively little is known even in the United States about the experiments that were made long ago concerning the transmission of electrical signals through non-metallic conductors.

As a rule, I think, Mr. Preece, of England, is cited as the originator of sending electrical signals through water, but as will be seen presently, this is a fallacy.

Some of the readers of your journal remember probably that in October, 1884, Mr. J. M. Bear read before the American Institute a paper entitled "Telegraphing Without Wires."

It is of interest to note that Mr. Bear, while speaking about his various tests, said: "I have never had an opportunity to test my plan with instruments of precision, etc. * * *, but I tested it through salt water, water of the Atlantic Ocean, in a little bay with about a half a mile of uninsulated wire—I got all the results from it I expected. I used a sounder, and with three or four cells to the battery and half a mile of uninsulated wire, I was only able to affect the sounder with the very weakest adjustment. It would not affect the relay at all, I presume by my not having battery enough, but the sounder certainly was affected at the distant end through the uninsulated wire immersed in the ocean water. These are the severest tests to which I have put the apparatus."

The method employed by Mr. Bear is clearly shown in the subjoined diagram: *acd* are copper plates, *m* a porous cup, *b* a zinc plate, *f* a tube filled with salt water. (See Fig. 1.)

It so happened that Mr. Preece was present at the reading of the paper and that he took a lively interest in the subsequent discussion. Referring to the general subject Mr. Preece said:

"It was in 1853 (31 years ago) Mr. Lindsey, a Scotchman who came to London with the notion shared in by a great many people since that he was going to make an enormous fortune because he had discovered a mode of electrical transmission across water without wires. He came to the electrical company to which I was attached and made an experiment exactly similar to that which has been made here. We gave him a tank about eight by ten feet. The instrument used was a Wheatstone signal needle, and we certainly got effects through it which showed distinctly that it was possible by such an arrangement as that to transmit electrical signals across water without the aid of wires at all; and the experiment was sufficient to justify its being tried on a larger scale. Experiments were tried probably on the River Tay. Two wires were located some few miles along the banks on either side and the experiments repeated and again they were successful.

"I took a little interest in the matter at the time, but I had the impression that such an experiment was described, I think, in a book published by Mr. Alfred Vail; I think Mr. Morse made a similar experiment."

Later on Mr. Preece stated that he had tried this experiment on a larger scale between the Isle of Wight and the mainland, the trial being occasioned by the breaking down of a cable. He substituted, however, telephones for the sounders. As to the result, I will quote the exact words of the speaker: "The experiment was so satisfactory that if this

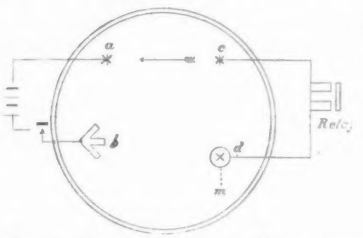


Fig. 1.—Bear's Method of Telegraphing Without Wires.

cable breaks again, then we shall certainly, during the time that it is broken, maintain telegraphic communication with the Isle of Wight through the sea circuit arrangement until the cable is repaired."

It should be stated here that Mr. Preece's impression about Mr. Vail's book was entirely correct. The latter published in 1845 a book entitled "The American Electro-Magnetic Telegraph," issued by Lea & Blanchard, Philadelphia. In it an entire chapter is devoted to the description of telegraphy without wires. The heading of this chapter is as follows: "Mode of Crossing Broad Rivers or Other Bodies of Water Without Wires."

It appears that Professor Morse addressed a letter to the Secretary of the Treasury, which letter was subsequently submitted to the House of Representatives, December 23, 1844. In this letter Professor Morse said: "In the Autumn of 1842, at the request of the American Institute, I undertook to give to the public in New York a demonstration of the practicability of my telegraph by connecting Governor's Island with Castle Garden, a distance of a mile, and for this purpose I laid my wires, properly insulated, beneath the water." Immediately after the sending of the first message the conductors broke and, as Mr. Morse says, "in the moments of mortification I at once devised a plan for avoiding such accident in future by so arranging my wires along the banks of the river as *to cause the water itself to conduct the electricity across*. The experiment was deferred for a time, but was tried December 16, 1842. The following diagram indicates Professor Morse's plan. *f, g, i, h* are copper plates. (See Fig. 2.)

Subsequently, Professor L. D. Gale made a series of careful tests concerning the best practical distance at which the copper plates should be placed. For historical accuracy it may be well to mention that Professor Gale's tests were actually carried out by his able assistants, Messrs. Vail and Rogers, across the Susquehanna River at Havre-de-Grace, a distance of nearly a mile.

We have thus traced the origin of telegraphing through water without continuous conductors from 1884 down to 1842, which date is probably the earliest one that can be assigned to this branch of applied electricity in the United States.

Turning now our attention to the labors of European electricians, we find that the proverbial German "Herr Professor" has not taken very kindly to that branch of telegraphy, although I have the impression that that inexhaustible fount of science alias Wiedeman's "Annalen" contains some valuable references, but as I am not so fortunate as to count these volumes among the books of my library, I cannot verify my belief.

Apparently very little was done on the other side of the pond prior to 1870, when Mr. Edison aroused the curiosity of the civilized world with his reports about "telegraphy without wires." The fact remains, however, that prior to Edison's publication concerning inductive telegraphy (originated and developed by Phelps), M. Leon Somzée, a Belgian electrical engineer, had solved the same problem. But besides inductive telegraphy he had given much attention to telegraphing through water. His two principal Belgian patents were taken out as early as in July, 1868, and December 8, 1870, respectively, and these patents were speedily succeeded by numerous "certificats additionnels." M. Somzée's plan, briefly described, consisted in the use of the several substrata of the soil, underground water courses, lakes and

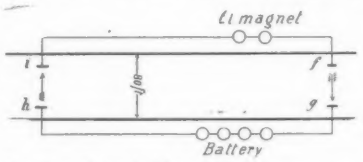


Fig. 2.—Morse's Method of Telegraphing Without Wires.

parts of the ocean as conducting media. *En passant*, it may be stated that a perusal of Somzée's patent of 1870, together with some additional certificates, will be found highly interesting at the present moment, because he describes therein very plainly the use of annular coils for the transmission of signals through space. But M. Somzée was striving to adapt his system to naval telegraphy, and he gradually worked out a complete and rather ingenious system of telegraphing, or telephoning, between distant vessels.

About the same time (1870) Captain Treves, commander of the cruiser "Le Dessaix," took up experimental work, aiming to establish telegraphic intercommunication between vessels. The first trial took place between "Le Dessaix" and "L'Argonaute," which was then in tow by the cruiser. An insulated conductor was strung from one vessel to the other, and grounded at both terminals by being connected to the copper keels of the ships. Of course, telephones were included in the circuit. Omitting the experiments of Lieutenant Desbordes, who quickly adapted a very similar method to the use of divers, we find that in 1884 Captain Treves continued his former experiments on the southeastern coast of France. He then succeeded in telephoning from aboard of his ship to the island of Aix, and the lighthouse of Oleron. And again in the same year, while in the harbor of Cherbourg, M. Palart transmitted electrical signals between distant vessels, while almost contemporary with him MacEver in the United States performed the same work.

From the above necessarily cursory historical sketch on telegraphy without wires, it is evident that Professor Morse is justly entitled to claim priority of invention among many modern rivals, and as there can be no jealousy about a dead man, I feel reasonably sure that this time the rival claimants will be willing to drop the palm leaf upon the grave of the father of American telegraphy.

Yours respectfully,
Victor M. Berthold.
Cambridge, Mass., Dec. 14.

PERSONAL.

Mr. Fred. W. Royce, of Washington, D. C., was in New York city early in the morning of Friday last.

Dr. Schuyler S. Wheeler has resigned his position as electrical expert to the New York Board of Electrical Control.

Mr. Frank Ridlon, of Boston, was in New York last week and favored the Electrical Review with a pleasant call.

Mr. W. H. McKinlock, president of the Metropolitan Electric Company, Chicago, is in the East on business and spent several days of last week in New York.

The United States Senate has confirmed the appointment of Hon. H. L. Storke as postmaster at Auburn, N. Y. Mr. Storke is president of the Empire State Telephone Company and is well known among electrical men.

Captain George N. Stone, the well-known telephone magnate of Cincinnati, has been elected a director of the Cincinnati Gas Light and Coke Company. Captain Stone is also a director of the Cincinnati Street Railway Company.

Mr. F. A. Scheffler, who has been the Stirling company's representative in New England, has taken charge of the company's New York offices at 126 Liberty street, vice Mr. John MacCormack, who has resigned from the Stirling company.

Mr. E. R. Stettinius, the active and alert treasurer of the Stirling company, Chicago, was among the out of town visitors to New York last week. Mr. Stettinius finds that the Stirling boilers are rapidly making new friends as well as keeping the old ones.

Mr. F. A. Hamilton, member American Institute Electrical Engineers, recently gave an interesting lecture before the electrical students of Armour Institute, Chicago, on the subject of submarine cables and cable laying. It was fully illustrated by lantern slides, made from original sketches and charts. Mr. Hamilton was for 16 years electrician-in-chief to the Anglo-American Telegraph Company.

Dr. Bleyer Says Dr. Gibbons Didn't Invent the Resuscitator.

To the Editor of Electrical Review:

In the Electrical Review for November 28 I find published an article describing a mechanical device for artificial respiration, to which Dr. P. J. Gibbons, of Syracuse, claims inventorship. This identical resuscitator and method of inducing respiration has been brought before the notice of my profession since 1890—before the Berlin congress, before the American Medical Association, 1889, and demonstrated before the German Surgical and Medical Society, of New York, in 1892, and, finally, I resuscitated three individuals by this means at the Hotel America in 1893. The publication and methods with details can be found in *The American Therapist*, November, 1893.

I don't wish to be misunderstood here, that I lay claim to the idea of resuscitating electrocuted persons, but claim the priority and method and inventorship of the mechanism as a whole. This claim of prior authorship has been made in the open meeting of October, 1894, before the New York County Association and published in the New York *Medical Record*.

The following is a report of three recovered cases of asphyxiation from illuminating gas, and a description of my resuscitating tube. Another tracheal tube can be attached quickly in any case, if preliminary tracheotomy is necessary, and so respiration can be established:

Within one week recently (November, 1893) three cases of asphyxiation from illuminating gas came under my care. They were cases of great urgency, and as the patients in each instance had been breathing in the gas from six to eight hours they did not promise much result when I first saw them.

On the morning in question I was summoned to a hotel, a stone's throw from my office, where a guest had been discovered unconscious in his room by one of the attendants. Two burners of a capacity of six feet per hour each were turned full on, which made the cause of the man's coma apparent.

The patient, Don A., 63 years old, from Costa Rica, where I am told gas is little used for illuminating purposes, had retired at 10 o'clock the evening before, closed all windows and doors, and bidding his physician, Dr. C., who accompanied him and who occupied the adjoining room, good night, prepared for bed.

This, with the onturned gas-burners, was the whole history of the case from that time until day-break—when he was discovered—that I could get.

Don A, lay upon his back in a state of profound coma. His face, notwithstanding his naturally dark complexion, was almost livid. The muscles of the face, neck, abdomen and thorax, twitched violently as if stimulated by strong faradic currents. His respirations were prolonged and shallow, particularly expiration, as nearly as I can recall them now, for I had no opportunity to make carefully detailed observations; at the time they were certainly not over four per minute. The pulse at the wrist and carotids were scarcely perceptible, and the heart's action was faint and irregular. It was all but flickering out, and once or twice, from the long intervals between the beats, I imagined that it had ceased altogether.

The first thing I did was to dispatch a messenger for a tank of compressed oxygen, which was obtained from Dr. Walton's factory in a very short time. While awaiting the arrival of the gas I remembered that I had just received my new model of an artificial respiring tube which I had devised for use in such cases of intubation of the larynx where there was danger from impending asphyxia. My assistant, Dr. Weill, secured the tube.

That this model of the respiration tube did efficient work, notwithstanding for a time we attributed it to the oxygen gas, is evident.

I append a drawing of the instrument. (See Fig. 2.)

It consists of a cylindrical tube about 12 inches long, made of flexible rubber, similar to that of which the ordinary esophageal catheters are manufactured. This is fixed at the upper extremity to a bifurcated tube of hard rubber, one extremity being intended for inspiration, the other for expiration. The lower tube is stiffened by a wire stillette for piloting the tube into larynx and trachea.

The objects of the bifurcated ends are many; air is sent through them by gentle blowing, or from a tank, or double bellows attached, and in this manner air or gas may be sent down into the smaller bronchi. The air may be heated to any desired temperature by dividing the rubber tubing from the tank or bellows and securing them with a section of metal tubing, under which an argand burner may be placed and the heat regulated by a thermometer stationed a short distance from the metal ends.

With the hurried examination of the patient here recorded I began the work of attempting restoration.

After injecting two syringefuls of brandy, I pried open the tightly fixed jaws, partially overcoming the trismus with a gag which I left *in situ*. The tracheal end of the tube was quickly piloted to a point about one inch and a half from the bifurcation of the trachea and the oxygen turned on. The oxygen, about which I know nothing save that Dr. Walton tells me it contains one per cent of ozone and a percentage of nitrogen monoxide, I further diluted by allowing air to enter through one end of the bifurcating tube while the oxygen was flowing.

For the first half hour no change in the patient was observable either to the eye or ear, save that the lividity decreased somewhat, as I also thought was the case with the muscular tremor. My assistant made gentle friction over the body, and applied the various methods of stimulating the muscles of respiration by means of faradism, etc.

The case at this stage looked extremely unpromising, yet we persisted with our treatment as before. At the end of an hour of hard work the respiration became a trifle deeper and increased to 10 per minute. The pulse at the carotids, too, now was readily appreciable, and the heart's force, particularly during systole, became stronger.

As the respiration and pulse toned up, the involuntary twitching diminished and I withdrew the tracheal tube after the contents of the first tank of gas were exhausted.

Three hours had elapsed. The bed of the patient being moved over near a window to catch the incoming air, I made a more extended examination of the physical condition. Over the surfaces of both lungs from the apices down to the fourth intercostal space, where they diminished in intensity, loud, bubbling rales could be readily heard without a stethoscope. This led me to anticipate the possible oncoming of a pneumonia from the irritation of the illuminating gas in the walls of the alveoli, and the consequent transudation of liquid into them. The respiration had now reached 10 per minute, and the heart's action indicated that the organ was making a struggle to overcome some

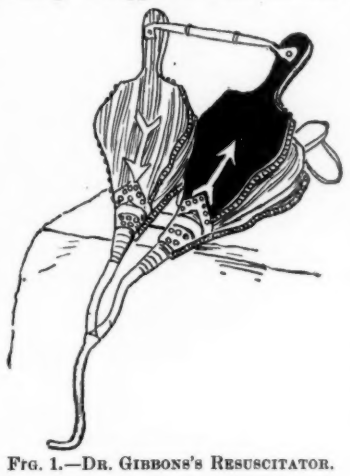


Fig. 1.—Dr. Gibbons's Resuscitator.

resistance in front of it. There was no evidence of returning consciousness.

It looked as if the chances of the man's recovery from now on were good and I was not a little astonished at what I regarded as the effect of the oxygen.

My former experience with oxygen had been very unsatisfactory, and even under ordinary conditions, with the respiratory organs in normal state, I had found that the weight of the gas impeded the likelihood of its osmosis through the walls of the alveoli. Here, however, to all appearance, oxygen had rendered a better account of itself without any particular reason therefor. We steadily gained ground until four o'clock in the afternoon, when the pulse suddenly became rapid and feeble and the heart turbulent. A cold, clammy sweat broke out all over the surface of the body, and the condition of the patient again became extremely precarious.

We held a hurried consultation and

Fig. 2.—Dr. Bleyer's Respirator.

while we were averse to add to the force behind the heart, we yielded to the advisability of injecting $\frac{1}{100}$ grain of strychnine. This dose had the effect of restoring the heart's tone, and the patient again rallied. At nine o'clock in the evening the patient was left to the care of his own physician; 14 hours after he was first seen he had not regained consciousness.

At five o'clock next morning, when I again saw him, he opened his eyes and began to mutter incoherently. From this out his recovery was rapid, and he was soon able to take a cup of bouillon and other stimulants, and before nightfall he was able to sit up and converse intelligently with those around him, although he did not realize the close shave he had for his life, and apparently remembered nothing of what he had gone through in the 48 hours since he went to bed after blowing out the gas.

Strange to say, three days later I was summoned to the same hotel, to the very same room, where two boys, also from Costa Rica, had adopted the Don's method of extinguishing the gas and were found in bed unconscious from its effects.

They were aged 16 and 18 years respectively, healthy and strong. From statement of the attendant, they had been in the room nine hours before the odor of the gas was traced to the apartment they occupied.

I adopted similar tactics, with the single exception that I used but a very small quantity of oxygen, which I allowed to mingle with the contents of a tank of compressed air that I had prepared for just such an emergency, by passing it through caustic soda and distilled water to free it from organic matter and nitrous compounds before confining it in the receiver. The recovery of the lads was far more rapid, and in three hours they were restored to consciousness, although in the case of the younger boy a rapid rise in temperature, together with a tense, hard pulse of 130 caused me to have some alarm over his condition. The temperature rose to 103.5 degrees Fahrenheit, and as the symptoms strongly indicated pneumonia, I had him removed to Bellevue Hospital, on account of the proprietors of the hotel, who did not care to have any more publicity. He remained for two weeks, at the end of which time he was discharged. The diagnosis in his case by the attending physician of the hospital was pneumonia, due to the irritative quality of the gas.

It is upon this proof here given and reference made to the various societies where I had the honor of demonstrating my method and mechanism that I claim the priority, hoping that Dr. Gibbons will be satisfied that I have the right to its inventorship.

Very truly yours,

J. Mount Bleyer, M. D.

New York, December 15.

OUR BOSTON LETTER.

The Norwich, Conn., Street Railroad Company has declared its second semi-annual dividend of two and one-half per cent, payable January 1 to stock of record December 26.

Since the reduction in the price of Century insulating tape, made some weeks ago, the Campbell Electrical Supply Company are having a considerable run on this line of goods, and their increased manufacturing facilities are being fully utilized. General trade with this concern continues good, and the future outlook is very encouraging.

Among the recent orders received by the Eastern Electric Cable Company, of this city, is one for over 5,000 feet of No. 61 conductor cable for the underground fire alarm service in Boston. This is the third order received by this concern from the same source, and comprises the bulk of the wire used by the department for underground work.

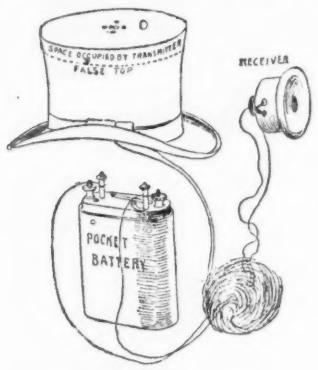
The Whitney Electrical Instrument Company, of Penacook, N. H., have placed their agency for the State of West Virginia and the western part of Pennsylvania in the hands of Mr. H. S. Sands, of Wheeling, W. Va., who will hereafter carry a full line of their well-known instruments. Mr. Sands is an energetic young engineer and contractor, and will no doubt meet with considerable success in his new undertaking. H. G. T.

Boston, December 15.

A TELEPHONE IN HIS HAT.

INGENIOUS DEVICE OF A CHICAGO LAWYER TO GET EVIDENCE DIRECTLY TO A DETECTIVE'S EAR.

Lawyer Laflin Mills, of Chicago, is the author of a very ingenious scheme, involving the use of a telephone in a silk hat, by which he secured certain direct evidence he desired. Two or three weeks ago Mr. Mills received a call from Dr. Peter Janss, who desired professional assistance. A man, who had not been extremely careful to conceal his identity, had been writing letters to Mrs. Janss. This man, he said, was a lawyer named Charles Ioas, with whom Dr. Janss was for some years intimate, but with whom he had a disagreement over a year ago. Soon after the alienation began, Warren Inslow, a clerk in Dr. Janss' office, received a typewritten letter signed "Thomas Jefferson," requesting him to hand an inclosed note to Mrs. Janss. As the writer said: "Do not let the doctor see it; it's about girls." Winslow, therefore, handed the letter and the inclosure to Dr.



THE HAT TELEPHONE.

Janss instead of Mrs. Janss. Dr. Janss suspected Ioas at once, and went straight to him and accused him of it. Ioas boldly admitted it and defied Janss.

Mr. Mills decided at once that additional evidence against Ioas would be necessary before it would be wise to make an arrest. He called in Post Office Inspector Stuart, and the practicability of proving the crime by comparing it with other work done on Ioas' typewriter was discussed. This plan was abandoned, and then Mr. Mills suggested the use of a telephone to get additional evidence of Ioas' confession. Subsequently, Mr. Mills consulted with his friend, J. P. Ellocott, an electrician, and a line of procedure was soon agreed upon. Dr. Janss was having occasional interviews with Ioas, in which Ioas would confess his authorship of the letter, but he was careful not to do so in the hearing of any third party. It was decided, therefore, to conceal a telephone on Dr. Janss' person, by means of which a third party at a distance could hear Ioas' confessions.

After discussing the cuff button, the necktie, and other parts of a man's attire as the best hiding place for a transmitter, it was finally decided to conceal it in the crown of Dr. Janss' silk hat. The hat was provided with two crowns and the transmitter put between them. The outer crown had through it a few eyelet holes for admitting sound. A battery was arranged for the coat pocket and this left only the wires and the receiver to be provided for.

The wire was 100 feet in length, and consisted of two fine copper twin conductors. The wire was attached to the transmitter in the hat, passed down the doctor's neck to the battery and thence down his trousers' leg to the heel of his shoe. When he next visited Ioas he was accompanied by Inspector Stuart and Detective Sandemeier. As he passed into the office Detective Sandemeier fastened the coil to the heel and unreeled the wire into a neighboring office. There Inspector Stewart connected it with the receiver and held the receiver to his ear. Ioas conducted Dr. Janss through several rooms, closing the doors as they passed, before he would talk. He did this without noticing the wire trailing at the doctor's heel. Then he talked long, loud and freely—right into the hat which Janss held in his lap—and boasted as before that he had written the letter. The conversation lasted an hour and Stuart took notes. As they came out Ioas discovered the wire, saw at once what was up, and immediately followed its course until he came to Stuart. But the inspector had already detached the receiver and looked innocent and absent-minded.

It is probable that if matters had gone no further Ioas would still have been safe, for no court has ever yet accepted a telephone as a witness. But Stuart afterward confronted Ioas and read from a paper all that he had said to Dr. Janss. Ioas broke down and confessed everything to the inspector. The result of this was that United States Commissioner Wirt held Ioas to the grand jury in bonds of $1,500.

A Large Alternator by the General Electric Company.

The General Electric Company is now building, at its Schenectady works, one of the largest alternating current generators ever constructed. The generator is to be installed at St. Louis, Mo., in the station of the Edison Electric Illuminating Company and will supply current for incandescent and arc lighting and for motor service. In order to secure efficient results for these various uses, the generator is constructed on the monocyclic system, recently adopted by the General Electric Company. This system employs a comparatively low frequency of alternations and the armatures of the generators have special windings adapting them for use on circuits with self-starting alternating current motors.

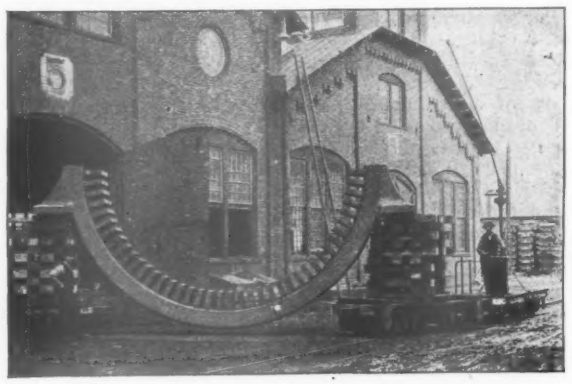


FIG. 1.—LARGE CASTING FOR THE GENERAL ELECTRIC COMPANY'S BIG ALTERNATOR.

The generator illustrated is of 800 kilowatt capacity, has 80 poles and is to be driven by a Hamilton-Corliss engine at 90 revolutions per minute. On account of the great size of the frame difficulties were to be expected in producing the castings, but thanks to the facilities of the Schenectady works no trouble was experienced in pouring even the large frame casting shown. This single piece made up in part of wrought iron embedded in the casting, weighs 35 tons and measures 24 feet over all. The armature is iron-clad and is 16 feet in diameter, weighing nearly 100,000 pounds. The armature will be supported on a 22-inch shaft.

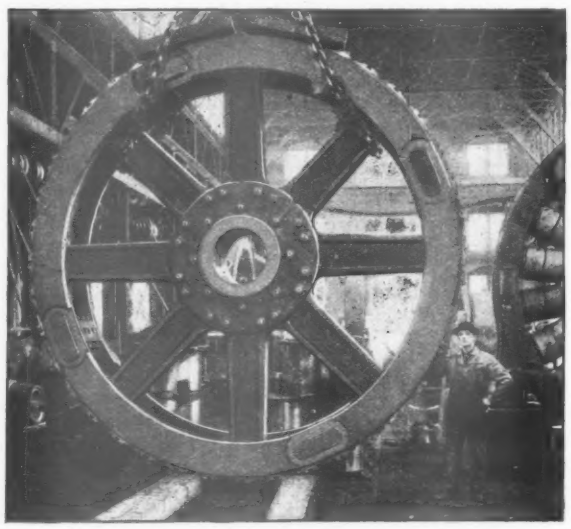


FIG. 2.—ARMATURE SPIDER OF THE GENERAL ELECTRIC COMPANY'S BIG ALTERNATOR.

The illustrations show also the armature spider before the laminations were placed upon it. An idea of its size may be had by comparing the spider with the 400 kilowatt rotary converter which stands to the right of it.

The completed generator will supply, when at full load, 667 amperes at 1,200 volts, equivalent to 16,000 sixteen candle-power lamps.

In this connection it should be stated that the great size of the generator was necessitated by the requirements under which the machine is to be operated, chief of which is the low speed of revolution.

LETTERS FROM OUR FRIENDS.

SELECTIONS FROM THE "ELECTRICAL REVIEW'S" MAIL.

The following letters are appreciative of the ELECTRICAL REVIEW in two respects—its value as an advertising medium and its enterprise in the way of free distribution of an admirable set of instructions for the resuscitation of persons shocked by an electrical current:

TO THE EDITOR OF ELECTRICAL REVIEW:

Please change our advertisement to read, "Chicago Office, 1,020 The Rookery, F. P. Thorp, Agent." I might add that we have received a great many inquiries from all over the country from customers quoting your paper as the place where they saw our advertisement.

Yours truly,
R. HUMFFREYS-ROBERTS,
Secretary and Manager Fontaine Crossing and Electrical Company.
Detroit, Mich., Dec. 10, 1894.

TO THE EDITOR OF ELECTRICAL REVIEW:

We have received your pamphlet, giving instructions for the resuscitation of persons shocked by an electrical current, for which we are very thankful. You would confer a favor upon us by sending us a few (say a half-dozen) copies of same, in order that we may frame them and hang them in our various stations for reference in case of accident. Thanking you in advance for same, we remain,

Yours very respectfully,
C. F. HESSER,
Manager The Cincinnati Electric Light Company.
Cincinnati, O., Dec. 11, 1894.

TO THE EDITOR OF ELECTRICAL REVIEW:

Please favor me with two (2) copies of your pamphlet on "The Treatment of Sufferers by Accidental Electric Shock." Enclose you two stamps as I have asked for two. I wish to send one to a friend of mine.

Respectfully,
C. W. EVANS, M. D.
Tremont, Pa., Dec. 11, 1894.

A SAMPLE OF HUNDREDS.

TO THE EDITOR OF ELECTRICAL REVIEW:

Enclosed please find money order for three dollars, for which please send me the ELECTRICAL REVIEW for the term of one year, and oblige,

Yours respectfully,
A. MESSERSMITH.
Buffalo, N. Y., December 14, 1894.

OBITUARY.

DEATH OF GEO. H. ROE.

George H. Roe, 42 years old, president of the Edison Light and Power Company, of San Francisco, died on December 3 at the house of his wife's uncle in Brooklyn, N. Y. He was a conspicuous citizen of San Francisco. He became ill with Bright's disease and came East six weeks ago to consult a specialist. He was a Canadian and went to San Francisco 18 years ago. He became interested in electricity 12 years ago and organized a syndicate of capitalists of San Francisco, and the company erected electrical plants in different parts of California. Mr. Roe leaves an estate estimated at nearly $500,000. His wife was with him when he died. She and her sister left the day of Mr. Roe's death for San Francisco, taking the body with them.

William E. Kelly, proprietor of the National Iron Works and president of the National Water Tube Boiler Company, was found dead in bed at his residence in New Brunswick, N. J., on December 11.

John Evans, a well-known and wealthy citizen of Binghamton, N. Y., died on December 6. He was vice-president of the Binghamton Electric Railroad Company and a member of the contracting firm of Ackerman & Evans.

LITERARY.

Dr. A. Conan Doyle has a dramatic poem in the January *Scribner's*, written in a quaint, old manner, telling "A Forgotten Tale." It will be illustrated by Howard Pyle.

The weekly journal, *Science*, will be published after January 1 under the direction of an editorial committee, in which each of the sciences is represented by a man of science who is at the head of his department. This committee assures a high scientific standard and wide field of usefulness to the journal.

The way in which fiction becomes fact has recently been illustrated in the organization in various parts of the country of "Matrimonial Tontine Mutual Benefit Associations." Every few days a newspaper paragraph appears announcing the formation of one of these associations in a new locality. The idea of this novel scheme for the protection of bachelors, of course, originated with Robert Grant's already famous story in the Christmas *Scribner*.

Give The Trolley A Chance.

The Philadelphia Traction Company will do a great service to the millions who must depend more or less on the trolley cars for their transportation about the city if it presses to conviction the cases against the men arrested on Thursday for blocking travel. There is too much of this. Drivers are purposely slow in turning out for the trolley from pure obstinacy, but dumping loads of lumber on the tracks, which is the offense of these men, is without even the semblance of an excuse.

The men who, in dumping a load of coal, halt a long line of trolleys filled with people impatient to reach their destination are made the subject of a bill introduced into Select Council on Thursday, by which the coal cart men subject themselves to a fine of $5 for obstructing the cars. Everybody must use the street without obstructing his neighbor. This is a fundamental principle that should have been invoked against the coal men long ago. Their assumed license to straddle the car tracks while a thin stream of coal trickles into a cellar window from a cart hoisted high in the air will not bear examination. It was an intense annoyance and chronic obstruction in the horse car days; it cannot be endured with the expectation of increased speed which has come with the trolley.

Ancient practices must conform to the new demands. The trolley has introduced new conditions on the streets, and coal carts, lumber wagons and all obstructions must give way and let the trolley car speed on its course. The streets are for the use of all, but there is no rule which authorizes the slowest to set the pace for all.—*Philadelphia Press.*

Electric Railway Conduit Construction in Lenox Avenue, New York.

The Metropolitan Traction Company, of New York city, has been anxious to introduce some mechanical power on certain of its lines now operated by horses, but it has realized that permission to install a trolley system cannot be secured, as the popular feeling against aerial wires is too strong. As the company wished, however, to discard animal power if a satisfactory substitute cheaper than the cable could be found, it determined to introduce an electric conduit system on one of its new lines. After some investigation and negotiation, the design of the conduit was intrusted to the engineers of the General Electric Company, and it was decided to install the new system upon the Lenox avenue line. The work has now been in progress for a considerable time, and the lines of the Metropolitan company. It seems to be a fact that the company regards electrical operation in the nature of an experiment, and therefore the conduit has been so constructed that the line can be operated by cable if the electrical working is not altogether satisfactory.

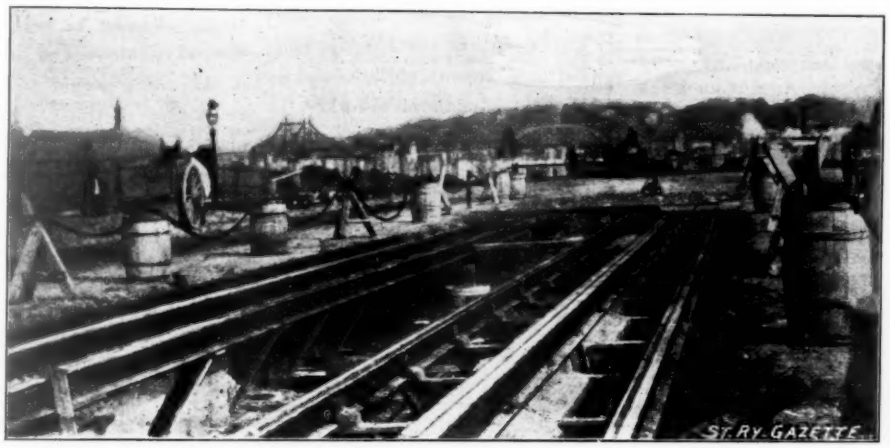


FIG. 1.—ELECTRIC RAILWAY CONDUIT CONSTRUCTION IN LENOX AVENUE, NEW YORK.

The conduit is a sheet-iron one and the yokes are of cast-iron. The rails are seven-inch girders and are laid on the ends of the yokes. The space between the flange and the head of the rail is filled in with cement. The manholes are located every 30 feet, and to the yokes at this point insulators are attached on suitable supports. The insulators are of rectangular form and are supported in cups and are imbedded in sulphur, as will be seen in Fig. 2. The insulators are made of soapstone, and fastened to the top is an arm of iron to which is fastened the channel iron contact conductor. As the insulators are located at the manholes, they are easily accessible. As two conductors are employed, no structural return circuit is required. The feeders will be carried in pipes laid between the tracks.

The contact shoe comes down through the slot, and has two arms pressing outwardly from the center supporting bar against the conductors, making a continuous rubbing contact. The voltage on the line will be from 250 to 300 volts.

The power station is located on 146th street between Seventh and Lenox avenues. The work on the structure has been commenced and is progressing rapidly. The foundations were started from a point about 25 feet below the grade of 146th street. The entire surface of the interior of the power station is laid with a bed of concrete about four feet in thickness.

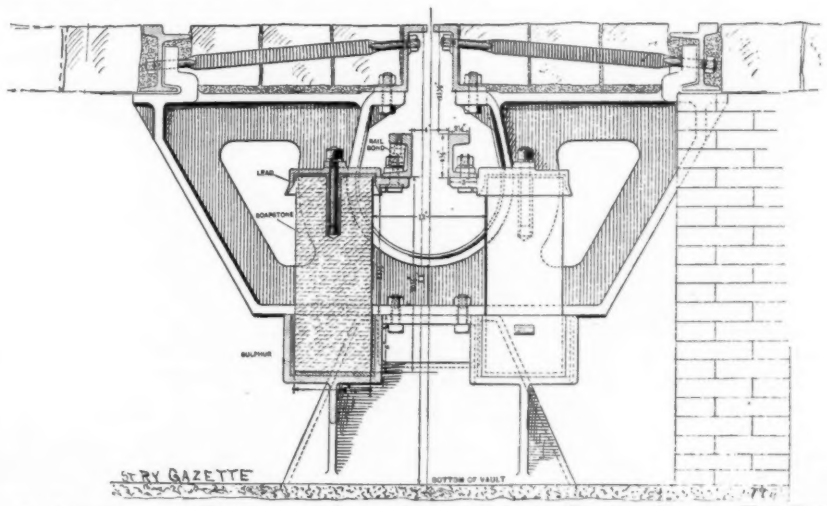


FIG. 2.—SECTION AT THE VAULT OF THE LENOX AVENUE ELECTRIC RAILWAY CONDUIT, NEW YORK.

accompanying illustrations, for which we are indebted to the *Street Railway Gazette*, show the general character of the construction. The photograph from which Fig. 1 was reproduced was taken at 146th street looking north on Lenox avenue.

The company has been prosecuting the work with great vigor. Most of the construction on the Lenox avenue line is now practically finished and for a considerable part of this distance the paving has been completed. It will be seen that the construction, which has been done with the greatest thoroughness, resembles very closely the cable work on the several

Electric Railway Progress in New Orleans.

New Orleans has made great progress in rapid transit during the last few months, no less than five new electric lines being added to its street railroad system. Last week an important deal was made, which assures it even more in the way of rapid transit and will give it at a very early day one of the best and most competent street car systems in the country. This was an arrangement by which a very large sum of money was loaned the New Orleans Traction Company by local capitalists for the completion of the lines now under way and the construction of new ones.

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Merry Christmas!

In refutation of the popular saying that lightning never strikes twice in the same place, a Southern newspaper says that a house in Calhoun County, Ga., has been struck by lightning 13 times and is in good condition for the next stroke. A good ad. for the lightning rods used on the house.

A new incandescent lamp meter—cheap and reliable—will be on the market in about 90 days. We mustn't tell you whose it is—but look out for it.

The handicap of legal complications which has heretofore retarded the development of the storage battery is now practically removed by the consolidation of the principal storage battery interests in this country just effected by the Electric Storage Battery Company, of Philadelphia, as officially announced elsewhere in this issue. The new organization is amply provided with capital, engineering talent and capable business men. With the direction of affairs in the hands of President W. W. Gibbs, we look to see the storage battery assume its proper position among the most important electrical inventions.

One apparent reason, outside of the naturally rapid growth of the electrical industry, that such an immense amount of new construction is in contemplation is that the business depression of the past two years has lowered the cost of labor and materials to an almost unprecedented degree. Electrical apparatus and supplies of all kinds were never so cheap as now, and the cash buyer can get a larger discount from the market prices than he ever could before. This is a most propitious time to purchase electrical goods and our information is that a large number of shrewd men are taking advantage of the situation. The man who moves or thinks slowly will find in the near future that his conservatism has been expensive.

The electric railway has been put to many novel uses for the pleasure, profit and convenience of humanity, but the most novel use of all was related in a press dispatch from Newburgh, N. Y., last Sunday. A hose cart being drawn to a fire by men happened to pass the electric railway car barn. The roads were heavy and as the superintendent instantly observed, the hose cart would not be of much service at the fire unless it got there quicker than it gave promise of doing. Without more ado, he ran a trolley car out of the barn, hitched the dragging rope of the hose cart to the rear platform, bundled the tired firemen into the car and towed the whole outfit off to the fire in rapid order. The day may soon be here when we will have trolley cars equipped with regular fire engine pumps—and then the poor fire department horse will be forced to join his brother, the car horse.

ELECTRIC RAILWAYS IN NEW YORK CITY.

Manhattan Island is almost an ideal paradise for the electric railway man. Our climate has changed to such an extent in recent years that a severe snow storm is a rarity. Then, too, the proximity of the gulf stream to our shores acts as a melter, which soon disposes of snow that has the temerity to remain more than a few hours. Besides, no matter where an electric railway might be run on the island there would always be an abundance of traffic. New Yorkers always seem to be going somewhere. A surface electric railway would be able to stand quite a handicap on schedule time and still compete with the elevated roads, because the climbing up and down stairs to and from stations would be avoided. That is one, and perhaps the principal, reason why New York city's cable roads are so successful. Another is that their cars are decently lighted and ventilated—two important considerations that are often neglected by railway men. If the underground conduit road, now building on Lenox avenue, mention of which is made on another page, is a success, we may look for a sudden and satisfactory development of electric railways in this city. Then it will be with gloating glee that we shall see the receipts of the Manhattan Railway Company drop down to a point where the service rendered is justly paid for. The street railway enthusiast will not be satisfied until every horse railway and cable road in New York city is electrically equipped—on the underground conduit system, if possible; or else with the storage battery.

In all the many years of the publication of the ELECTRICAL REVIEW there has never been such an increase in its subscription list, or such a unanimous renewal of old subscriptions, as has been the case during the last 30 days. The business manager is always pleased to see the advertising pages well filled with responsible advertisers, but the one thing that makes the editor's heart glad is to know that his paper is being read and appreciated and widely circulated.

We publish in this issue the conclusion of Mr. Gano S. Dunn's admirable lecture on "Direct Current Motor and Dynamo Design." The thorough grasp of the principles involved and the simplicity and lucidity of Mr. Dunn's demonstration of his subject mark this lecture as one of the classics of the year. Any of our readers, whether he be old or young in the science, can learn something by a careful perusal of Mr. Dunn's remarks.

Wall Street and the Electrical Stock Market.

The stock market for the week was of a bull order. The passage by the House of the railroad pooling bill caused a general covering of short interests in the railroad stocks and deterred the bears from putting out short contracts later in the week. The shipment of $3,600,000 gold, the bulk of which was engaged on Friday, caused a general realizing movement in the latter days of the week, and prices closed substantially lower. The stock of the American Sugar Refining Company absorbed the bulk of attention, advancing heavily on enormous transactions. An effort is being made by insiders to sell out in view of the acknowledged bad condition of the sugar trade and the competition of German refined sugar. The market of the future will depend largely upon the action of the Senate on the pooling bill, which is now before it. Trade reports show an irregular condition of business and some improvement over November. Several thousand manufacturers report that during November the payment of wages was 15.2 per cent over November 1893, and 18.3 per cent decreased as compared with 1892.

The stock of the Edison Electric Illuminating, of New York, advanced from 99 on Monday to 103½ on Thursday. I am told upon good authority that this strength is due to the complete absorption by investors of a block of some 15,000 shares of the stock which has been hanging over the market for 18 months. During the panic General Electric, which was so hard pressed for cash, sold to a syndicate 15,000 shares of stock at prices which would average about par. This has been gradually put out since that time at figures not far from par, and has all been taken by investors. This gradual selling has had the effect of keeping the stock down, and now that liquidation is over, friends expect to see the price advance. Another cause of the strength was the excellent November statement, showing a material increase in net earnings and an expansion of business.

I am told that a number of the leading interests in this property have recently sold their debenture bonds around 109 and re-invested the proceeds in the stock at par. By this transaction they have secured a 6 per cent security for one bearing 5 per cent and increased the amount of their holdings by some 9 per cent. It is reasonable to assume that no attempt will be made to convert the bonds into the stock. A call was made in 1893 which enabled bond owners to secure stock, par for par, between May 15 and June 15. Six hundred and eighty-eight thousand of the bonds was thus exchanged. However, owing to the panic, owners preferred a 5 per cent bond because of the better security in preference to a 6 per cent stock, and the great bulk of the issue was undisturbed. The rights of exchange extend to July 21, 1895. On that date, upon 60 days' notice, no further conversions can be made. It is probable, in view of the wide difference in price between the stock and bonds, in favor of the latter, that there will be no further conversion.

General Electric was moderately active and firm around 35½. No particular news developed concerning the property, which, in this era of bear rumors and attacks, is regarded as a good sign. The underlying securities of the company showed unmistakable strength, reflecting a steady improvement in the company's affairs. The appreciation of the preferred stock, as noted elsewhere, was one of the most favorable features. The debenture 5 per cent bonds advanced another point to 91¼ on more than ordinary transactions. Capitalists now regard this issue as an excellent security, which at the present price is cheap.

Western Union was strong between 88 and 89¼ on limited transactions. The declaration of the regular dividend was expected and caused no perceptible movement in the stock. The balance sheet for the December 31 quarter, partially estimated, shows a surplus after all charges and dividends of $165,200. The surplus for the corresponding quarter for three years, commencing with 1893, were $121,738, $571,415, $680,295.

The following electrical dividends were declared during the week: American Bell Telephone, the regular quarterly 3 per cent and 1½ per cent extra, both payable January 15. Books close January 1 and reopen January 15. Edison Electric Illuminating, of Brooklyn, regular quarterly 1½ per cent, payable January 15. Books close January 1 and open January 15. Western Union Telegraph regular quarterly 1¼ per cent, payable January 15. Books close December 21 and open January 1.

The dividends declared by the American Bell Telephone Company make 15 per cent for the year as against the old rate of 18 per cent. The extra dividend is payable out of the surplus earnings of the six months ending December 31.

American Bell Telephone stock developed considerable strength in view of the dividend declared, on which the stock will sell next December 31. It sold at 199 and at the close was held at 200¼.

General Electric preferred was much more strongly held than last week. The highest price at which it was offered was 73. It sold at 70 and at one time was bid 70¼. The quotation on New England Telephone is 66 and 67. Erie Telephone sold at 52½. There was no change in Fort Wayne Electric. Westinghouse common advanced 1 point to 33 bid and 34 asked, and the preferred was bid 51 and held at 52.

The range of bid prices of leading telephone stocks for the month ending December 16 is as follows:

	Nov. 17.	Dec. 15.
Bell Telephone	196½	198½
Erie	52½	52
Hudson River	40½	40
Mexican	75¢	70¢
New York and New Jersey	97½	97½
New England	66	66

The stability is due largely to the inactive nature of the securities.

I hear upon authority that there is no truth in the rumor that the General Electric and the Westinghouse have in any way combined in the matter of prices.

The trustees of the Street Railway and Illuminating properties this week canceled another lot of preferred stock amounting to 4,424 shares, at an average cost of $109.54 per share, which compares with $105.72 the last bid. This makes the total number of shares canceled to date 22,562, or slightly over one-half. BAIN.

New York, December 15.

GENERAL NOTES.

The Erie Telegraph and Telephone Company made a net gain of 74 subscribers for the month of November. Total number connected December 1, 16,006.

Hon. Chas. A. Schieren, Mayor of Brooklyn, N. Y., has gone to Bristol, Tenn., to visit the leather belting tanneries of Chas. A. Schieren & Company.

A trolley road will be built from Patchogue to Port Jefferson, L. I. The stock will be owned by New York men, it is said. The line will be about 14 miles long.

The Berlin Iron Bridge Company, of East Berlin, Conn., are furnishing the iron work for the new office building of the Pope Manufacturing Company at Hartford, Conn.

The report of the Brooklyn, N. Y., Subway Commission shows that the total length of all electrical conductors in that city is 15,840 miles, of which 9,350 miles are either underground or suspended from the elevated structures.

The Westinghouse Electric and Manufacturing Company has been awarded a contract by the West End Street Railway Company of Boston, for a large consignment of electric railway apparatus. This is the third order which it has received from that company within a year's time. The present order is for $200,000.

The New York State Board of Railroad Commissioners has dismissed the charges of Stockholder H. M. Thompson against the Brooklyn City Railroad Company, alleging that the financial reports had been doctored so as to deceive the stockholders. The board finds that the company's connection with the Long Island Traction Company is in the interests of the stockholders, and that its accounts are all correct.

The Lancaster Railway Construction Company has secured the contracts for building the extensions of the Reading Traction Company's system at Reading, Pa. The first line will be some 15 miles in length and work will be commenced at once. Everything will be up to the highest standard and the Medbery line material will be used on the overhead line work. All material will be furnished by the Hubley Manufacturing Company, of Lancaster, Pa.

American Institute of Electrical Engineers.

The ninety-second meeting of the Institute will be held at 12 West Thirty-first street, New York city, on Wednesday, December 19, at 8 P. M. A paper will be presented by Mr. Ludwig Gutman, of Chicago, entitled "On the Production of Rotary Magnetic Fields by a Single Alternating Current." In the absence of the author the paper will be presented in abstract by Dr. M. I. Pupin. A meeting of western members will be held the same evening, Wednesday, December 19, 8 P. M., at Armour Institute, Thirty-third street and Armour Avenue, Chicago, where the paper will be read by the author.

Boston Electric Light Company May Issue $660,000 In Bonds.

The Massachusetts Board of Gas and Electric Light Commissioners has rendered a decidedly interesting and important decision on the petition of the Boston Electric Light Company for approval by the board of an issue of bonds to the amount of $900,000. This amount was intended as a part of the issue of $1,250,000, all of which had been voted by the corporation. The objects to which the proceeds of the bonds were to be devoted were: First, $360,000 for constructing underground conduits and placing wires therein; second, $300,000 for the refunding of existing mortgage bonds; third, $240,000 for the payment of floating indebtedness. The commissioners, in their decision, offer no objection to the issuing of bonds for the first and second purposes named, but decline to approve an issue of bonds for funding the floating debt.

Celebration in Honor of Von Helmholz.

A memorial celebration in honor of the life and works of the late Professor Hermann von Helmholz was held in the hall of the Song Academy at Berlin, on December 14, the services beginning at noon. A large gathering was present, including the Emperor and Empress, the Faculty of the University of Berlin, the members of the Ministry and municipality, the members of the Reichstag and many other distinguished persons. Herr Joseph Joachim, the celebrated German violinist, was among those who took active part in the exercises. An address eulogistic of Von Helmholz was delivered by Professor Bezold. An immense bust of Von Helmholz, almost buried in flowers, occupied the center of the stage.

No Manhole Explosions in Captain Stone's Telephone Subways.

TO THE EDITOR OF ELECTRICAL REVIEW:

I have to report Cincinnati "short" on manhole explosions. We have no experts competent to keep us in line with some of the eastern cities in that regard, and as a result we have had no experience with such scientific problems.

Our manholes have trap sewer connections and perforated manhole covers. Our methods are not patented. Respectfully,

G. N. STONE,
General Manager City and Suburban Telegraph Association.
Cincinnati, O., December 15.

Shepp Brothers, who are the owners of the Norristown and Citizens' Passenger Railways, of Norristown, Pa., have leased from the Perkiomen and Reading Turnpike Company track space on the turnpike from Perkiomen bridge to Trappe, a distance of two and one-half miles. The price paid is $5,750 and the lease is to continue for 999 years. The tracks to be laid by the Schepps must be placed along the side of the road, so that this turnpike company may sell another similar franchise.

PRESENT AND PROSPECTIVE DEVELOPMENT OF ELECTRIC TRAMWAYS.

READ BEFORE THE SOCIETY OF MECHANICAL ENGINEERS, NEW YORK, DECEMBER 6, 1894, BY C. J. FIELD.

It seems hardly necessary to review the past development of the electric tramways; it has been made apparent on every side of us, commencing, it may be said, with the introduction of electric motors on a large scale on the roads of Richmond, Va., about seven years ago by the old Sprague Company. This was the first commercial undertaking of any size or capacity for the operating of a large service of horse railroad with electric motors, and the conditions and requirements under which this contract was taken were enough to discourage any but the most persistent and courageous. Grades of 10 and 12 per cent, sharp curves, poor track to operate on and no past experience to go by were some of the difficulties encountered. This road developed the system in its main features as it stands to-day, two motors being mounted independent of the car body on the truck and driving to the axle by gear. With the improvements and modifications which seven years have brought into the field, this system stands in the main what Mr. Sprague made it at that time.

The first motors installed on this road were seven and a half horse-power each. Later on these were changed to 10 horse-power, and a year or two later 15 horse-power motors became the standard. Then 20 and now two 25 horse-power motors are the standard street railway equipment which is generally made.

Street railway managers were soon attracted by the results there shown, and the next large system to follow Richmond was Mr. Whitney's then new consolidated system in Boston, the West End railroad. There the Thomson-Houston company practically had the field for enterprise and experiment, and carried on still further the development which had been started at Richmond, working out still larger problems than had there been undertaken. The result is to-day that, outside of a few cable roads, there is not a street railway system of any size in the country where electric traction has not been or is not being now introduced on an extended scale, requiring enormous additional outlay of capital in this installation. There had been before the commencement of electric traction a growing demand for more rapid transit in large cities, and this had to be met in some way. The cable had been introduced in a number of cases, but on account of its excessive cost and special requirements and conditions to make it a success, in addition to the necessity of a heavy traffic in order to make it a commercial success, its introduction had been limited to a few large cities.

The advantage of electric traction was that it was equally available to the little cross-country horse line or the largest system in our large cities, and under the heaviest conditions of traffic and service. One of the first results of its introduction was the satisfying of the demand for more rapid transit, and the large increase in gross and net earnings, and the reduction of operating expenses, especially on the question of power. One of the early fields to be developed was the interurban service between cities for connecting small towns with large cities. One of the first and most marked examples of this kind was the interurban service between Minneapolis and St. Paul. After its establishment it compelled six different steam roads to practically abandon the service they had been maintaing between these cities.

We have seen it in the last year or two carried still further at the World's Fair by its introduction on the Intramural road, and now being further extended on the elevated structures; and there are now being equipped one or two of the large steam roads for handling special problems, as, for instance, the Baltimore and Ohio tunnel at Baltimore, where the entire freight and passenger service of the road is to be handled by large electric locomotives of 10 to 12 hundred horse-power capacity. The amount of capital and the confidence with which capitalists and investors have taken hold of the electric tramway has been something marvelous when we consider the short time they have been in service, and though you might find a few failures owing to poor management, over-capitalization, or some other sufficient cause, in general we find an uninterrupted line of successful extensions and enterprises in this line. I will try to make a brief general review of the different parts of the electric tramway system, and show the development which has been made in each.

ROADBED.

There is probably no part of a street railway system which was more antiquated in its general construction than the majority of the roadbeds were found in this country when cable and electric traction were first introduced, and it took some severe lessons in many cases to bring about appreciation of the necessity of good roadbed construction. The old horse road construction was in somewhat the condition of the old steam road construction 50 years ago, being a stringer construction, with ties four to five feet on centers in the majority of cases, and a flat rail, either center or side bearing, and weighing from 30 to 60 pounds to the yard, spiked to the top of the stringers. The result naturally reached with the introduction of electric traction on such a track, with its heavy service and severe wear and tear owing to self-propulsion, was a failure of the roadbed entirely. On paved streets the ties had to be placed sufficiently low to enable the use of paving blocks over them. Therefore, with the commencement of the introduction of girder and T rails, which, when first introduced, were three to four inches, and in some cases five inches, in depth, it required the placing of these rails on a cast or wrought iron chair or stringer in order to get the depth over ties for paving. This method proved very little better than the old flat rail, under the added requirements of the service, and especially at the joints, and contracting engineers and officials of street railway companies very rapidly reached the appreciation of the necessity of using the heaviest possible rails obtainable, and the rail mills were pressed to undertake the rolling of heavier and deeper girder and T rail, and after overcoming all difficulties they have reached at present a state of development which gives us, we believe, a roadbed construction equal to that of any steam road in the country; and the standard to-day for electric tramway roadbed is 70 to 80 pound T rail, or 70 to 98 pound girder rail, the depth of these rails running from seven to nine inches.

Ninety pound rail, being nine to 10 inches in depth, enables them to be spiked direct to the ties and give the necessary depth for paving. This heavy rail, with eight to 12 bolt joint plates, supplies every requirement. The girder rail is being generally used in paved streets, and T rail on suburban roads, and, for the last year or two, to a considerable extent on macadamized roads, and even in a few cases on paved streets. By the introduction of special details of construction, and especially on macadamized and asphalt streets, the T rail seems to offer as good a roadbed, both for the railroad and the public, as the side-bearing girder rail. Ties used should be standard railroad ties.

The special work on track work, such as cross-overs, turn-outs, curves, etc., has also met with large improvement. The old form of special work was iron castings, which very rapidly depreciated under the conditions of this service. Next we had introduced the rails cut into the special shape as required by conditions and bolted together. These also very rapidly depreciated, and became loose in the joints, etc. Now we have as a standard for this special work the steel rails bent to the form required, and surrounded by a mass of cast metal to hold them together, and one company is turning out this special work with the parts welded together; also in cast steel. One company is introducing track work in which, instead of joining up the rails with channel and joint plates bolted together, the rail is being welded electrically into a continuous rail. A section of track in Cambridge, Boston, and also one at Johnstown were laid in this manner, and this year is being introduced on a very large scale on the entire system of a road in Brooklyn, N. Y., where 50 miles or more of 90 pound rail is being laid in this manner. The experiment is a bold one and deserves success. We have got to await a severe Winter to see what success will be achieved by it. The process of welding this up is to weld two joints and skip the third, and come back at night, when everything is cool, and weld this third joint. By this process they expect to overcome the difficulties which they encountered last year, in which, after one Winter's test, six per cent of the joints pulled apart.

TRACK BONDING AND ELECTROLYSIS.

We are hearing a great deal to-day about electrolysis and electrolytic action of the current on the return side of the tramway circuit. In the early introduction of electric tramways, and with the light section of rails, the usual method was to bond up the rails and connect them with the return copper or iron wire of varying sizes which was laid between the rails. At first the size was No. 4 and 6 wire, and later on 0 and 00 was used. With the introduction of 70 and 90 pound section of rail we have met the question of sufficient capacity in the conductivity of the rail. The present requirements are to bond the rail in such a manner as to insre a continuous connection of all the tracks, and thus provide means for the return connection to the power station; and we believe it may be said that the best standard of construction to-day is to double bond all the joints of the rail with the shortest possible bond which is practicable, and cross-bond each rail every few lengths and also cross-bond to the other track. This insures a uniformity of potential in the rails. Then, by connecting this track by overhead feeders run in the same manner as the feeders to the trolley, connected every half mile or so to the track, we believe we have a practical solution of the difficulties which have been encountered in the proper return of the current, and a prevention of the trouble which has been encountered where this return was not sufficiently provided for, and the current, taking to the water and gas mains, causing the trouble and damage resulting from same.

LINE CONSTRUCTION.

When we run across some of the old cases of line construction, as at Richmond and other places, and then compare them with the present form of construction which is now being introduced, it gives us a better illustration than words can describe of the improvement which has been made in overcoming the objections which existed in the earlier work. Then we had for insulation old pieces of glass and porcelain and little blocks of wood, the whole making a poor mechanical and electrical job and giving considerable trouble.

The standard of trolley wire then was No. 4. Now the standard is a No. 0 or 00 wire. Then the poles used were plain little telegraph poles, about six inches at the top and eight inches at the butt, which quickly gave way under the strain of service. Now we have a well built line, substantial in every respect. The poles used are either a heavy octagonal sawed pole, or various types of iron poles. Local city authorities, though, have compelled the use of iron poles in most cases, and various types of pipe and trussed sectional iron poles have been introduced. The difficulty with the iron pole construction is to get good insulation between the trolley wire and the ground. The general line material, such as trolley insulators, feeder insulators, pole insulation, etc., have all been brought to a high state of development, and at present we can purchase this material and know pretty well that we are getting first-class insulating qualities. On all city work the general form of suspension for the line is cross suspension, with the poles located on the curb.

FEEDER WIRE.

Feeder wires have been more and more liberally introduced and used, and at present, on the best construction, the system is laid out and figured to maintain a distribution of potential over the entire system with a drop of not exceeding five to eight per cent under the most severe conditions or heavy stress of weather. Feeder wires in general have been run overhead, but we believe it is an assurance of better service on large roads to run the main feeder trunk lines in underground conduits, and we have done this in several cities with successful results. With proper arrangement of feeders, cut-outs, section insulators, etc., and proper distribution of the feeder lines on the switchboard, we have complete control of our system, and, in case of trouble, are able to localize that trouble to the smallest possible section of the line and provide a quick remedy therefor.

(To be continued.)

DIRECT CURRENT MOTOR AND DYNAMO DESIGN.

A LECTURE DELIVERED BEFORE THE NEW YORK ELECTRICAL SOCIETY NOVEMBER 27, 1894, BY GANO S. DUNN.

(*Concluded from page 289.*)

So much for forced commutation. The other method of stopping sparking is only by applying an electro-motive force to the coil A, just as it comes out of circuit, so that by the time it comes into circuit it shall have its current. Applying the electro-motive force means that you have a little dynamo working to get up the current so as to have it ready. Now that electro-motive force will be applied by the magnet held in my hand, and I will endeavor to show you how it will work. (Mr. Dunn started the machine.) This is an armature which has not any field acting on it at all. It seems to me that sparking can be understood better if we talk about it entirely separated from the field magnets. So I have an armature here which is simply revolving in the air. Now I am going to pass its normal current through it and will show you that it sparks. This has not forced commutation because it is a copper brush. Neither is it prevented from sparking by the electro-motive force, because there is none acting upon it. To spark is the normal, natural condition of the armature. I have here a carbon brush which will stop the sparking by virtue of its resistance, and will be an example of forced commutation. You see sparking is killed by virtue of the resistance of the carbon brush.

Now I will show a method of killing the spark on this copper brush by means of the electro-motive force applied.

I have here a magnet, Fig. 6, which is energized from the circuit and which will throw out a few lines of force. I will apply it to the armature in the region of the brush and you will see the sparking disappear. (The armature, Fig. 6, is supposed to be driven by another motor.) It may happen that the polarity of this is wrong when I put it on and it may make the current in the coil go the wrong way so that when it is thrown into circuit it will have to stop the current that is flowing wrongly and then start a proper current and the sparking will be increased. (Applause.) The polarity is right and you see the sparking disappears.

Now I am going to give this not quite enough electro-motive force to bring its current equal to the current in the rest of the armature. I will do that by moving the coil a little to one side. The sparking appears again. Now I am going to give it too much, so that the current generated in the coil under the brush is too big for the rest of the circuit. Now it is equal to it, and there is no sparking; now it is too big, and the sparking appears again.

Sometimes it happens that an armature with brushes at the neutral point sparks worse than it would if it were let alone. This is because the magnetism from the opposite pole comes over and increases the spark. It is drawn over apparently by the revolution of the armature. That condition can be imitated by reversing the polarity in this coil. I will first reduce the sparking to zero by this electro-motive force. Now I will reverse the direction in the coil. The effect is vicious sparking.

You have seen how an electro-motive force will stop sparking and you have also seen how resistance in the brush will also do it. Now the commutation of every machine that is built takes place by means of one or the other or a combination of these devices. The larger the machine, the more difficult it is to adopt forced commutation, because the excessive heating of the brushes causes the commutator to overheat. To design a dynamo so that it will not spark—a dynamo of any size—is merely so laying out its magnetism that it will always get a little squirt of lines of force right in the brush. Now you see me moving this coil towards its brush to stop the sparking. But what you do in an actual case—you cannot move the magnets or you cannot move a little coil like this—is to

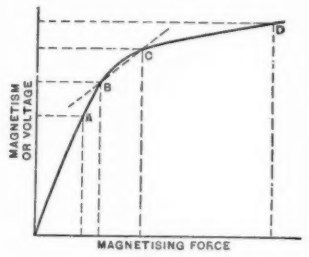

FIG. 7.

move the brush so that it comes under the edge of the big magnet of the machine and that accomplishes the same result. That is why shifting brushes stops sparking. It enables you to get a little fringe of magnetism which trails off the toes and does the same thing that you saw this little coil do.

There are reactions that oppose the coil and there are also reactions that oppose this action at the toe of the machine. Before you shift brushes you may have a fringe of magnetism that would stop the sparking, if it could get at it. But by the time the brush is moved towards it that motion of the brush has induced reactions into the circuit which have driven back the magnetism. A very important point in dynamo designing is the providing that magnetism shall not be driven away. To show you one of the reactions that tends to drive away that magnetism the next experiment is arranged.

Here is a motor that would normally run forward. As you see, it has no field coils on it, so any magnetism that it may get to run it will have to come from the armature. Now, as I said, it would naturally run forward if it were working with the magnetism generated by its field. Now I will put the armature current alone through it—its regular current that it would have ordinarily—and you will see how it runs. You see it runs backwards. That is what the armature would do if it could in any motor. The fields have to be strong enough to overcome that tendency, and besides overcoming it to give sufficient magnetism to make the armature go forward. That is one of the things that destroys whatever little fringe we have to reverse our coils and prevent sparking. The machine is now running simply on the reaction field produced by the armature. There are no coils on the machine. This reaction is due to the negative ampere turns of the armature. It is easily calculable, and what we have to do is to make the magnetism that comes up this magnet of such strength that it goes through the big air gap offering so much resistance to it that the little extra resistance offered by that reaction on the armature amounts to nothing in comparison, and so that when the armature offers this resistance we still have our little fringe of lines of force which act as the little coil did to stop the sparking.

In a motor we shift the brushes back to stop sparking, because the proper polarity of fringe comes out of one pole, and in a dynamo we shift the brushes forward to stop sparking, because the proper fringe comes out of the other pole.

A method of increasing the resistance of the air gap is, in the toothed armatures, to make the teeth very narrow. Here is a toothed armature of a four pole machine. All the magnetism that gets into this armature has got to get into it through these teeth, under about 70 degrees of pole piece. You can see that the sum of these teeth are not enough to carry all the magnetism that would go through that core. The result is that the magnetism is squeezed so hard that the reaction of the armature does not amount to much. This effect that I showed, of a motor running backwards, will do the same thing as the winding attributed to both Ayrton and Perry and Sprague will do. If the conditions were right we would have a motor, even with fields on it, such that its reaction will be such in proportion to the effect of these fields that while the armature will not run backwards when the load comes on, yet it will so weaken the field magnets that the armature speed will increase. I have known instances of this, and it can be secured by a little proportioning of the armature very easily and without any other winding. All the benefits, whatever they are, of the winding of Ayrton and Perry and of Sprague could have been secured by proportioning their armatures without going through the expense and trouble and elaborate calculations of the differential motor winding.

One more feature that I wish to call your attention to relates to compound winding of dynamos. That problem is a serious one and is more so than it used to be. A compound wound machine, as you all know, is a machine which, when the load comes on, instead of having its pressure fall off a little, as everything does—steam engines, water wheels, all slow up and pull down a little bit when the load comes on—will have its pressure rise a little. This rise is for

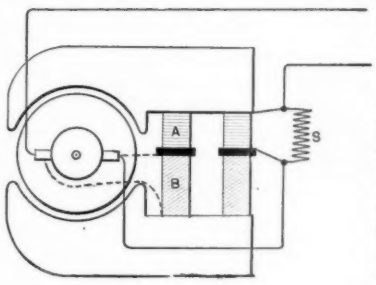

FIG. 8.

the purpose of compensating for loss of pressure in this line. Now if you are lighting a number of lights at a distant point, and when you have all your lights burning let us assume that you get 10 per cent less pressure at your lights than you would if you had only one of them burning, a compound wound dynamo can be made so that as fast as the pressure falls, due to—call it friction of the current in the wire—the dynamo increases its pressure to make up for that, with the result that your lights have always a constant pressure. The voltage at your dynamo rises but your lights are constant. We ought to have this so that at half load the increase of potential would be half of the increase that we have allowed for, and with three-quarters it would be three-quarters, and at full load it would be the full increase. That is impossible to attain exactly.

The use of voltage must be obtained by increasing the magnetism of the machine as the load increases. Suppose we want an increase of 10 per cent in voltage. If we start at C, Fig. 7, we can increase the magnetism and at D will have 10 per cent more magnetism than at C. But notice at what a sacrifice we have had to more than double the magnetizing force. Not only does that reduce efficiency, but it means double the amount of copper. But the curve from C to D is straight and at half load we get half the increase of potential and at full load a full increase.

If I should work in the region between B and C, then at half load we would get a good deal more than half the increase of potential wanted. So we cannot work on that part of the curve; that would injure the lights. Now if we work down on the point of the curve where it is straight again from A to B, we secure the results of an even increase of potential. But here we have a machine which we are working at a saturation B, and all the capacity from B to C is wasted. In other words, we have to use considerably more iron in that machine in order to saturate the iron at so low a degree as will allow its curve to be straight, and that makes the machine much more expensive, and less efficient, because we have copper wire around that iron which gives rise to a great many disadvantages. Now I have devised a method for enabling this portion of the curve B to C to be used with a straight rise of potential. The custom of builders is shown in Fig. 8. One engineer will specify that he wants a two per cent, another a three per cent, another a four per cent, another a seven and a half per cent increase of potential. The manufacturer cannot meet all those demands, so he winds every machine for, say, 10 per cent increase of potential, and Fig. 8 represents a machine so wound. These coils B are the shunt winding. Those coils A are the series winding. The current as it comes out of the armature goes in around the series windings and then out to be used. It will be seen that at no load the series coil is not excited at all, while at full load it gets a good many amperes through it and that increases the magnetism enough to make up for losses and raises the potential. If this machine is wound for 10 per cent over-compounding and a user orders five per cent over compounding, it is the custom of the manufacturer to insert a shunt S. Whereas the whole current would, previous to the addition of the shunt, have gone through the coils A and out and given 10 per cent increase, now the current divides equally between the coil and shunt and gives only five per cent increase in the magnetism. It has been customary to make this shunt of some material whose resistance is fixed, so that if a user ordered five per cent he would get a five per cent distribution at all times, and it was considered bad to have this changed. The shunt was also made very large to keep it cool. By making this shunt, not of German silver, as is customary, but of iron, which has a very high temperature co-efficient, and then, instead of making it large, making it very small, so that a small amount of energy will heat it up and change its resistance as much as possible, we can at full load throw into the series coils a good deal more than the proportion they would get at light load. That extra current, if the increase of magnetism were proportional to increase of magnetizing force, would tend to make the increase of potential follow a curve convex downward. Now the increase of magnetism tends to follow a curve whose convexity is

upward and the shunt tends to go up, so the result is the potential rises along a resultant of these two which can be made a straight line. But there is this proviso—you must wait for the shunt to get hot. If you put a sudden load on the machine for five seconds and then take it off again, the rise of potential will follow the straight line. We could inclose the shunt in a vacuum so that it would reach its temperature in half a minute. If the generator were for lighting, the load would not change suddenly, and therefore the increase of potential could be counted on to be practically proportional.

ELECTRIC RAILWAY NOTES.

The Camden and Atlantic Railroad may be trolleyed from Camden to Atlantic City, N. J.

Two lives were saved by safety fenders last week, one in Baltimore and one in Newark, N. J.

The Philadelphia Traction Company has begun the installation of the trolley on all its cable lines.

Wm. Wharton, Jr., will get a permit to build an electric railway around and through Fairmount Park, Philadelphia.

A syndicate of New York business men, headed by Horace Loomis, Chief Sewer Inspector and Engineer of New York, has purchased the plant and franchise of the North Mount Vernon, N. Y., and Chester Hill Horse Railway.

The New London, Conn., Street Railroad Company has declared a semi-annual dividend of three per cent, payable January 1, to stock of record December 26. This is the company's second dividend and is an increase of one-half per cent over previous one.

The Brooklyn, N. Y., Aldermen have decided that all trolley cars must be fitted with safety fenders. A fine of $50 is to be imposed for violation of the order. A resolution was also adopted that no open cars be allowed when the temperature is below 60 degrees Fahrenheit.

The Dallas, Texas, Rapid Transit Street Railroad (Commerce street system) has been sold out under foreclosure sale to satisfy a debt of $28,000. The property was knocked down at $35,000. It was bid in by W. S. Fair, E. A. Studley and W. S. Walthen, for the first mortgage bondholders.

The postmaster at Rochester, N. Y., has taken advantage of the progressive spirit of the Rochester Street Railway Company and devised a scheme for improving the postal service of that city. The letter carriers have been provided with special tickets, from which the day and hour printed thereon is punched by the conductors of the cars, upon which they may ride in the delivery and collection of mail.

Articles of incorporation for the Staten Island, N. Y., Electric Railroad Company have been asked for. The incorporators are the same persons who purchased the Staten Island ferry franchise last October. Gen. Samuel Thomas and Thomas F. Ryan are at the head of the movement. The object of the new corporation will be to build an electric road connecting the towns of the upper end of Staten Island with the Staten Island ferry. The capital stock will be $1,250,000.

It was announced last week that work will shortly be commenced by the Widener-Elkins syndicate on their new line from Baltimore to Washington. The road will be 32 miles long, and contracts for more than half the distance have already been awarded. The first section, between Washington and Laurel, is expected to be in operation by April 1, 1895. It is estimated that it will cost $1,000,000. The line will be double tracked and laid with 80 pound steel rails. The trains will have a guaranteed speed of 60 miles per hour, the fastest schedule time for any electric or steam railway. The block signal system will be used for the prevention of accidents.

A meeting of the Connecticut Association of Representatives of Electric Railroads was held at New Haven, on December 10, that bids fair to be the starting point of a big fight between the steam and electric roads of the State. The meeting took place behind closed doors, but it was learned that the object of the meeting was to discuss the situation of the electric as compared to the steam roads, and take steps toward meeting amendments passed by the legislature so as to put the electrics on an equal footing with steam roads, to which the electrics are fast becoming dangerous rivals.

As an outcome of the investigation by a committee of the New Brunswick, N. J., Board of Aldermen regarding the rumors of bribery in the securing of an electric railway franchise, two suits for libel have been instituted by City Collector William H. Price, of New Brunswick, against Joseph W. Ballantine, of Somerville, and City Treasurer James Neilson, of New Brunswick. The damages asked for are $50,000. The suits are based on the public statement of Neilson and Ballantine that Price was the recipient of a $10,000 check given by the New York and Philadelphia Traction Company to secure rights of way and privileges through New Brunswick.

The details of the biggest street railway consolidation ever effected in Pittsburgh were completed on December 11. The new system, under the name of the Second Avenue Traction Company, will be in operation by January 1, and has a paid-in capital of $5,000,000. There are four branches, with a total of 60 miles of track. The main line extends from Market street, Pittsburgh, to McKeesport, a distance of 10½ miles. This distance will be traveled in 45 minutes, and the fare will be 20 cents. A power house of 22,000 horse-power is now nearing completion at Glenwood. On the line the company has purchased a large farm, which will at once be changed to a park. James D. Callery is president of the new company.

TELEPHONE NEWS AND COMMENT.

Moberly, Mo., is to have telephone service.

East Boston, Mass., has a new central exchange.

Arrangements are being made to put in a telephone line from Mexico to Santa Fe, Mo.

A telephone line will be erected at once along the entire line of the new Choctaw railroad from Oklahoma City to McAlester, Oklahoma.

The Bell Telephone Company, of Buffalo, has been notified to remove its wires and poles from the streets of Lockport, N. Y., by the Common Council. The company refused to reduce the price of rentals.

Representatives of the Standard and Harrison Telephone Companies met face to face before a municipal committee recently and argued in favor of their respective companies for a franchise in Bay City, Mich.

The New England Telephone and Telegraph Company is constructing a new line between Westfield, Mass., and the Lee exchange. The new line will connect with the hill towns, and hereafter the latter will be given long-distance service.

The Common Council of Richmond, Va., have, by an unanimous vote, passed a resolution, to take effect 12 months hence, revoking the ordinance giving the Southern Bell Telephone Company the right to run its poles and wire along the streets of that city.

There are no indications at present of any request before the incoming legislature for legislation in favor of American Bell Telephone Company, says the Boston *News Bureau*. The company certainly contemplates no application for legislation or modification of last year's enactments.

The New York and New Jersey Telephone Company is negotiating with several Patchogue business firms for an extension of its system to the east end of Long Island. The company's line now extends to Islip, and if the necessary rights of way are obtained the system will be extended to Patchogue immediately.

The American Telephone and Telegraph Company will not only use stronger poles in replacing the lines downed in storms which occurred in New England early in November, but will increase the aerial cable outfits to decrease the strain on the poles, so that blizzards will be less effective hereafter on the long-distance telephone service.

The long-distance telephone lines of the American Telephone and Telegraph Company now cover a territory included between Madison, Wis., on the West, Waterville, Me., on the East, Marinette, Wis., on the North, and Washington, D. C., on the South. Over 2,000 towns are connected by metallic circuit lines with this long-distance system.

The Central Massachusetts Electric Company has commenced installing a telephone system that is to take in the towns of Palmer, Thorndike, Three Rivers, Bondsville, Warren, Monson, Stafford Springs and Rockville, Mass. About 20 subscribers, it is reported, have already been secured, and the first instruments have been ordered and will at once be placed in position at Monson.

The directors of the Missouri and Kansas Telephone Company met last week at the general offices in Kansas City and did something that promises to result most advantageously to St. Joseph, Mo. They decided to change their overhead system of wires at St. Joseph to the conduit system; they decided to build at St. Joseph a new office building at a cost of $100,000 for the central exchange, and they decided to exchange the ground system of wires for the metallic circuit system.

A new telephone company, the Danbury Local Telephone Exchange, is being organized at Danbury, Conn. Each subscriber is to be a stockholder in the company, and the subscribers will elect their own directors and manager. They are to pay $30 a year rental for their telephones, and if the running expenses are less than the amount received from rentals, the surplus will be divided among the subscribers. The Southern New England company will build and equip the lines of the new company, and the latter will pay an annual rental to the former.

The Pittsburgh, Pa., Committee on Corporations last week considered an ordinance conferring rights on the East Pittsburgh Telephone Company and the Electric Messenger Company to lay wires underground and string them overhead for the purpose of transmitting sound, heat, light and power. It was referred to a sub-committee, together with a resolution instructing the committee to have a special ordinance prepared for the use of councils relating to all such electric companies, their operation and regulation, and restricting their powers to conform with existing law.

The directors of the American Bell Telephone Company last week declared a regular three per cent dividend and an extra dividend of one and one-half per cent, payable January 15 to stock of record December 31. The company's books close January 1 to January 15, both days inclusive. The extra dividend is officially declared payable "out of surplus earnings of the six months ending December 31." This extra dividend of one and one-half per cent, which has been declared for two successive quarters, although making but 15 per cent for the year, gives hope of regular quarterly dividends of one and one-half per cent hereafter, and a return to the old basis of 18 per cent per annum.

ELECTRIC LIGHT FLASHES.

Mrs. M. E. Doty has purchased the H. A. Doty Electric Light and Power Company's plant at Janesville, Wis.

The electric light plant at Oskaloosa, Ia., valued at $30,000, was destroyed by fire early in the morning of December 11, and the city is in darkness.

The Edison Electric Illuminating Company, of Boston, will hold a meeting this week to vote upon a proposition to increase its capital from $3,000,000 to $3,425,000.

Engineer James D. Schuyler estimates that Astoria, Ore., can build a 60 arc light water-power electric light plant for $10,000, which can be run for $398.50 per month or an average of $6.65 per light per month.

The electric light and water works plant, of Chillicothe, Mo., has been sold under foreclosure of a $250,000 mortgage in bonds to George M. Meyers, of Kansas City, Mo., who represented the bondholders.

The City Council of Lynchburg, Va., rescinded its recent action in granting a contract to the Lynchburg Electric Company for lighting the city for five years, and referred the matter to a committee with authority to advertise for bids.

The Dayton, Ohio, electric light plant, owned by the General Electric Company, has been bought by a syndicate of Dayton men. The plant is valued at $600,000. The Dayton syndicate is headed by J. E. Lowes, R. N. King and Charles Reber.

The Edison Electric Illuminating Company, of Brooklyn, N. Y., makes the following comparative showing for November:

	1894.	1893.	Inc.
Nov. Gross....	$50,018	$36,930	$13,088
Net	26,109	20,494	5,615
Net for Divs.	28,029	19,971	8,058

The Edison Electric Illuminating Company, of New York, makes the following comparative statement of its earnings for November:

	1894.	1893.	Increase.
Gross.....	$145,904.00	$121,701.54	$24,202.46
Net.....	82,290.42	65,585.84	16,704.58
Eleven months:			
Gross.....	1,236,016.57	1,078,369.37	157,647.20
Net.....	645,782.40	506,710.29	139,072.11

The new plant of the Osage, Ia., Electric Light, Heat and Power Company, to replace that burned several months ago, is ready for operation. The company has put a new seven-foot dam across the Cedar River, two miles west of the city. The city will have 17 street lights.

The Western Electric Company will call in the assistance of the courts in its endeavor to secure the contract for the electric lighting plant at Allegheny City, Pa., which was recently awarded by the City Council to the Westinghouse Electric and Manufacturing Company. The Western Electric Company was the lowest bidder.

The Swift Electric Light Company, of East Saginaw, Mich., increased its incandescent plant by some 1,200 lights last month. This company operates in the cities of East Saginaw, Bay City and West Bay City, and is effectively managed by Mr. H. L. Brintnall, who resides at East Saginaw. Mr. Alex. Swift, of Cincinnati, Ohio, is president, and Mr. L. T. Hubbard, of Covington, Ky., is vice-president. The Brush and United States systems are operated.

Mr. C. A. Bodwell, superintendent of the Mousam River Railroad, Sanford, Me., has purchased the old Falls, Me., water-power and considerable adjoining land on both sides of the Mousam River. The water-power is expected to generate 1,000 horse-power. As soon as practicable, Mr. Bodwell will form a stock company. Early in the Spring it is proposed to erect a plant for the purpose of generating electricity, the power to be transmitted to Sanford, Me., and used for manufacturing purposes. The company will also supply light and heat.

Superintendent of Public Parks Parsons appeared before the New York Gas Commission last week and asked that 200 naphtha lamps be placed in Central Park. The Park Board have been trying to get gas and electric lights, and failing to do so are willing to accept naphtha lights. The Commission awarded contracts for the lighting of the city for the coming year by gas and electricity. It will cost $935,000. The contracts for electric lighting were awarded as follows: The Brush Electric Light Company, 295 lamps at 40 cents a night, and 92 lamps at 45 cents a night; the United States Illuminating Company, 411 lamps at 40 cents a night; the Mount Morris Electric Company, 344 lamps at 40 cents a night; the Madison Square Electric Company, 299 lamps at 40 cents a night, and 10 lamps at 50 cents a night; the Harlem Light Company, 210 lamps at 40 cents a night, and 10 lamps at 50 cents a night; the Manhattan Electric Light Company, 163 lamps at 40 cents a night; the Edison Electric Illuminating Company, 107 lamps at 50 cents a night; the North River Electric Light Company, 827 lamps at 45 cents a night.

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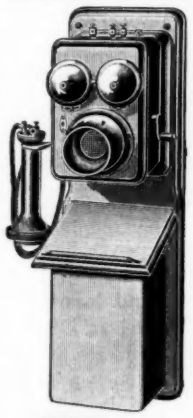

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KINDRED INTERESTS

The Buffalo, N. Y., General Electric Company is mailing to its friends copies of an interesting little pamphlet called "Buffalo Up To Date."

The Proctor-Raymond Electric Company, Rochester, N. Y., are sending out pamphlets describing the "Eclipse" iron box bell, which has several commendable features.

The Central Electric Company, of Chicago, is probably the busiest electrical supply house in America. This company has an enviable reputation for prompt and reliable deliveries.

Partrick & Carter, of Philadelphia, are crowded with orders. Their business this Fall is very large. It is evident that reliable houses like theirs are getting the business.

The Hubley Manufacturing Company, Lancaster, Pa., are making a great success of their overhead electric railway materials with Medbery insulation. They handle the Mason telephones and all kinds of electrical specialties.

The Niles Tool Works Company, Hamilton, Ohio, has prepared a very attractive illustrated booklet describing its machine tool equipments for street railway repair shops. The machines described can be furnished with electric motors for driving them.

The Mianus Electric Company, Mianus, Conn., has issued an illustrated catalogue of interior and exterior loud speaking telephones. They manufacture an extensive line of instruments for every service at reasonable prices and report that their factory is running full time filling orders.

The Metropolitan Electric Company, Chicago, have taken the general western agency for the Large & Twinging station and line switches and are getting in a large stock of all sizes. They are sending out a little booklet describing the Ideal lightning arrester, for which they are the general agents.

The Central Electric Company, 173-175 Adams street, Chicago, has issued a supplement to its latest general catalogue. They have added so many new goods and specialties to their immense stock, and prices and general quotations have so materially changed, that it was thought advisable to issue this supplement in preference to waiting for the next regular issue of their catalogue.

A Boston Firm Sued.—Marr & Gordon, a granite firm at Barre, Vt., contracted with Almon & Sargent, of Boston, for the latter to place an electric motor in the South Barre Polishing Mill with which to furnish power for the granite works. Marr & Gordon claim that the work done by Almon & Sargent was not up to the contract and that it is a total loss. They have sued Almon & Sargent for $6,000 damages.

The Mather Electric Company, of Manchester, Conn., have just been awarded, through their New York contractors, Messrs. H. B. Coho & Company, the contract for three 100 kilowatt direct connected generators of their new type for the lighting plant of the new Congressional library building at Washington, D. C. Very extensive tests of this new apparatus were made by government experts at the Manchester factory, and the adoption of this apparatus by the United States Government reflects great credit on the Mather Electric Company.

The Standard Paint Company, 20 Liberty street, New York, report that they have recently received some very large orders for "P. & B." compound and tape, especially the latter, from their general western agents, the Metropolitan Electric Company, Chicago. They state that, notwithstanding the very unfavorable time at which the Metropolitan company took up the sale of their goods in the West, and although they have been handling them only about a year, they have in that time, doubled the Standard Paint Company's business in electrical goods in the West.

Interior Conduit and Insulation Company.—The American Electric Supply Company, of Buffalo, N. Y., have severed their agency relations with the Interior Conduit and Insulation Company, of New York. The American Electric Supply Company is one of the oldest agents of the conduit company and the relations between the two companies have always been of the pleasantest character. The conduit company, however, have found that their interests are antagonized when represented by a construction house and have consequently changed their policy, and in the future will be represented by supply houses not engaged or financially interested in the construction business. The American Electric Supply Company could not afford to give up the large construction business they enjoy and hence followed a friendly termination of their agency relations with the Interior Conduit and Insulation Company.

The increase in electrical business, now being done by the General Electric Company, has necessitated an increase of their already extensive facilities at Schenectady, N. Y., and two large buildings are now being constructed. One of these is a storehouse, 353 feet long and 52 feet wide. The foundations are already laid and the superstructure is rising rapidly. This will relieve the smaller storehouses now found entirely inadequate. The other building will be used as a laboratory for standardizing. It will be erected on the very outskirts of the tract of land owned by the company at Schenectady in order that it may be as far away as possible from the disturbing influences of moving iron and heavy electric currents in and around the many buildings of the plant proper. This laboratory will contain all the standard instruments of the company, and with these the working instruments, which are in use throughout the factories for testing purposes, will be compared each day.

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